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PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	30.06.2005
Applicant's or agent's file reference	**IMPORTANT NOTIFICATION**
PF030105	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2004/006981	23.06.2004	01.07.2003

Applicant
THOMSON LICENSING SA et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PF030105	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2004/006981	International filing date *(day/month/year)* 23.06.2004	Priority date *(day/month/year)* 01.07.2003
International Patent Classification (IPC) or national classification and IPC H04N9/31		
Applicant THOMSON LICENSING SA et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☒	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☒	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
01.02.2005	30.06.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Schreib, F Telephone No. +49 89 2399-7114

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/006981

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-11	as originally filed

Claims, Numbers

1-13	filed with telefax on 28.04.2005

Drawings, Sheets

1/2-2/2	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☒ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☒ the claims, Nos. 14,15
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/006981

Box No. II Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
   ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
   ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).

2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

   see separate sheet

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1,3-12
	No:	Claims	2,13
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-13
Industrial applicability (IA)	Yes:	Claims	1-13
	No:	Claims	

2. Citations and explanations (Rule 70.7):

   see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

   and / or

2. Non-written disclosures (Rule 70.9)

   see separate sheet

1. The following documents are referred to in this communication:

   D1 : EP 1 081 964 A (SHARP KK) 7 March 2001 (2001-03-07)
   D2 : EP-A-1 337 117 (THOMSON LICENSING SA) 20 August 2003 (2003-08-20)

Re Item II.

2. Amended claim 2 and amended claim 13 have their basis in the description of the application page 10, paragraphs 4 and 5. The subject-matter disclosed in description page 10, line 4 - page 11, line 13 is not disclosed in the priority document FR0307956. Therefore the priority claimed for the application according Article 8 PCT is not valid for the added subject-matter in claims 2 and 13. Therefore the subject-matter disclosed in D2 is available prior art with respect to claims 2 and 13 as D2 has been published on 20.8.2003 which is earlier than the filing data 23.06.2004 of the application.

Re Item V.

3. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not inventive in the sense of Article 33(3) PCT.

3.1 Document D1 discloses (the references in parenthesis applying to this document):

Optical motor adapted to receive a light beam of variable colour along an illumination axis *(see col. 4, lines 23-28 and Figure 2, references 112 and 114: The system comprising e.g. the beam splitters 122 and 146 and the imager 148 is an optical motor. Illumination source 112 in combination with colour wheel 118 generates a light beam of variable colour along an illumination axis)* comprising:

a matrix imager, each pixel of which reflects the light beam with a polarization that depends on the image to be generated in the received colour, the reflected beam being said modulated beam *(see col. 6, lines 41-47 and Figure 2 especially reference 148)*; and

a first polarization splitter adapted to transmit a polarization of the light beam of variable colour in a first direction towards said matrix imager *(see col. 6, lines 44-47 and Figure 2, especially reference 146: The splitter transmits the p polarisation of the light beam consisting of Gp, Rs and Bs - p and s indicate polarisation - towards the imager 148)* and to transmit, at least partially, said modulated beam in a second direction *(see Fig. 2, references 146 and 148 and reflected beam: The beam reflected by imager 148 is partially reflected by splitter 146 in the direction of splitter 138 which is a second direction)*

a second polarization splitter adapted to transmit the said polarization of the light beam of variable colour in a third direction towards the first polarisation splitter *(see column 5, lines 7-10 and Figure 2, references 122 and 146: The s polarised beam Rs, Bs and Gs is reflected towards splitter 128 and the polarised beam Gp, Rp/Bp is transmitted towards splitter 146 which is the first polarization splitter. The third direction is the direction from splitter 122 to splitter 146 along the optical axis of both units)*;

the optical motor being adapted to transmit a polarised modulated beam *(see column 5, lines 46-57 and Figure 2: The light which is modulated by the reflective LCD panels is polarised. Therefore the modulated beam is polarized)*

3.2 The subject-matter of claim 1 therefore differs from this known D1 in that:

The second polarization splitter being adjacent to the first polarization splitter, without any polarization element separating the first and the second polarization splitters. Therefore the subject-matter of claim 1 is novel with respect to D1.

The problem to be solved is therefore how to simplify the optical engine of D1.

3.3 As the second beam splitter already is a polarizing beam splitter it is obvious for the person skilled in the art to leave out any polarization elements between first and

second polarization splitters. When one leaves out the polarization of Fig. 2 in D1 the polarization splitters are adjacent. Therefore the person skilled in the art arrives at the subject-matter of claim 1 without an inventive step. Hence the subject-matter of claim 1 does not meet the requirements of Article 33(3) PCT.

4. The subject-matter of claim 2 does not meet the requirements of Article 33(2) PCT.

The document D2 (see item II. of this communication) discloses (the references in parentheses applying to this document):

Optical motor adapted to receive a light beam of variable colour along an illumination axis *(see col. 4, lines 31-39 and Fig. 1)* comprising:

a matrix imager, each pixel of which reflects the light beam with a polarization that depends on the image to be generated in the received colour, the reflected beam being said modulated beam *(see col. 4, lines 5-10 and Fig. 1: The unit with reference 22 is the matrix imager)*; and

a first polarization splitter adapted to transmit a polarization of the light beam of variable colour in a first direction towards said matrix imager and to transmit, at least partially, said modulated beam in a second direction *(see col. 4, lines 18-20 and Fig. 1: The unit 16 is the first polarizing splitter transmitting the light beam to the imager and the modulated beam reflected by the imager in a second direction)*

a second polarization splitter adapted to transmit the said polarization of the light beam of variable colour in a third direction towards the first polarisation splitter, the second polarization splitter being adjacent to the first polarization splitter, without any polarization element separating the first and second polarization splitters *(see col. 4, lines 5-10 and Fig. 1: Polarizing splitter 14 is the second polarization splitter. There is no polarization element between first polarization splitter 16 and second polarization splitter 14)*;

the optical motor being adapted to transmit a polarised modulated beam *(see col. 4, lines 18-20 and Fig. 1)*,
the first *(see Fig. 1, reference 16)* and second *(see Fig. 1, reference 14)* polarization splitters comprise each a splitting surface *(see Fig. 1)* and in that the first and second polarization splitters are positioned so that

the polarization of the light beam of variable colour, which is transmitted in the third direction crosses the splitting surface of the second polarization splitter *(see Fig. 1: The light beam transmitted in third direction is the black arrow from block 14 in direction of block 16)*,

the polarization of the light beam of variable colour, which is transmitted in the first direction crosses the splitting surface of the first polarization splitter *(see Fig. 1: The black arrow starting at splitter 14 crosses the splitting surface of first splitter 16 in a first direction)* and the polarization of the modulated beam, which is transmitted in the second direction is reflected by the splitting surface of the first polarization splitter *(see Fig. 1: The modulated beam reflected from imager 22 is transmitted in a second direction and reflected by the splitting surface of the first polarization splitter)*

Hence all the features of claim 2 are known from D2.

5. Dependent claims 3-13 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) PCT) or inventive step (Article 33(3) PCT) for the following reasons:

5.1 The splitting surface of the first polarization splitter *(see D1, Figure 2, reference 146)* formes with the light beam an angle of -45° and the surface of the second polarization splitter *(see D1, Figure 2, reference 122)* forms with the light beam an angle of 45°. Therefore the subject-matter of claims 3, 4, 6 and 7 is not inventive.

5.2 The subject-matter of claim 5 discloses a display device comprising the optical motor of claim 1. As a display device with an optical motor is well known also the subject-matter of claim 5 is not inventive.

5.3 The imager 148 in D1, Fig 2 lies on the illumination axis. Therefore claim 8 is not inventive.

5.4 The first polarization splitter 146 in D1, Fig. 2 is partly transmit by the modulated beam in the direction of imaging means for display on a screen. Therefore claim 9 is not inventive.

5.5 The apparatus of Fig. 2 in D1 uses the colour wheel 188 having at least 2 colour filters. Therefore the colour of the light beam varies periodically and the light beam passes periodically through each colour filter. Hence claims 10 - 12 are not inventive.

5.6 In the apparatus of D1, Fig.1 the light beam is of different colours, forms sequential coloured beams and each coloured beam having the same polarization (The beam F_{S1} in Fig.1 of the application has another polarization and does therefore follow another path) follows the same path. Therefore the subject-matter of claim 13 is not novel with respect to D2.

Re Item VI.

6. The subject-matter of claim 1 is disclosed in D2. As the priority date of the application is later than that of D2, D2 might be relevant in the regional phase with respect to novelty of claim 1.

NEW SET OF CLAIMS

1. Optical motor adapted to receive a light beam of variable colour along an illumination axis, comprising :

- a matrix imager (16), each pixel of which reflects the light beam with a polarization that depends on the image to be generated in the received colour, the reflected beam being said modulated beam ; and
- a first polarization splitter (18) adapted to transmit a polarization of the light beam of variable colour in a first direction towards said matrix imager and to transmit, at least partially, said modulated beam in a second direction ;

characterized by :

- a second polarization splitter (20) adapted to transmit the said polarization of the light beam of variable colour in a third direction towards the first polarisation splitter, the second polarization splitter being adjacent to the first polarization splitter, without any polarization element separating the first and second polarization splitters ;
- the optical motor being adapted to transmit a polarised modulated beam.

2. Optical motor according to Claim 1, characterized in that the first and second polarization splitters comprise each a splitting surface and in that the first and second polarization splitters are positioned so that

- the polarization of the light beam of variable colour, which is transmitted in the third direction crosses the splitting surface (21) of the second polarization splitter (20)
- the polarization of the light beam of variable colour, which is transmitted in the first direction crosses the splitting surface (19) of the first polarization splitter (18), and the polarization of the modulated beam, which is transmitted in the second direction is reflected by the splitting surface (19) of the first polarization splitter (18).

3. Optical motor according to one of claims 1 and 2, in which the splitting surface (19) of the first polarization splitter (18) makes with the light beam an angle of a defined value in a first plane containing the light beam and in which the splitting surface (21) of the second polarization splitter (20) forms with the light beam an angle having an opposite value to the defined value in a second plane containing the light beam and parallel to the first plane.

4. Optical motor according to Claim 3, in which the defined value is equal to 45°.

5. Display device comprising :

- an illumination system that generates a light beam of variable colour along an illumination axis ;
- the optical motor according to one of the claims 1 to 4, the optical motor being adapted to receive the light beam from the illumination system
- the modulated beam being polarised at the output of the display device.

6. Display device according to Claim 5, in which the first polarization splitter (18) and the second polarization splitter (20) are arranged symmetrically with respect to a plane (PP') perpendicular to the illumination axis.

7. Display device according to one of Claims 5 to 6, in which the splitting surface (19) of the first polarization splitter (18) and the splitting surface (21) of the second polarization splitter (20) make between them an angle having an absolute value of about 90°.

8. Display device according to one of Claims 5 to 7, in which the matrix imager (16) lies on the illumination axis.

9. Display device according to one of Claims 5 to 8, in which the first polarization splitter (18) at least partly transmit said modulated beam in the direction of imaging means (12) for display on a screen (14).

10. Display device according to one of Claims 5 to 9, in which the colour of the light beam varies periodically among a plurality of colours.

11. Display device according to one of Claims 5 to 10, in which the illumination means comprise at least two colour filters (7), the light beam passing periodically through each colour filter (7).

12. Display device according to either of Claims 5 to 11, in which the light beam is of three different colours successively in each period.

13. Display device according to either of Claims 5 to 12, in which the light beam is of different colours, forming then sequential colored beams, each colored beam following the same path in the optical motor and having the same polarization.